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## OIL AGGLOMERATION OF FINE COAL

In Ukraine have carried out a series of scientific-investigative works related to applied and theoretical aspects of the coal oil agglomeration process. The investigations were carried out in Donetsk State Technical University and Coal Chemistry National Academy of Sciences(NAN) of Ukraine, Kharkiv polytechnical Institute, Institute of Biocolloide Chemistry NAN of Ukraine and also on coal preparative factories and thermoelectric power stations of Donbas. Theoretical and practical elaborations have been made, experimental results have been obtained.

Theoretical bases of the process of selective oil agglomeration are developed on the bases of modern state of physical chemistry, physical-chemical hydrodynamics, adhesion theory, solid fuel chemistry. The necessary and sufficient conditions for aggregate forming coal and oil components in water have been formulated.

The oil agglomeration process was run at a demonstration plant a capacity um to 3 t\h, also a industrial plant a capacity um to 6 t\h (on Avdiivsky coke-chemistry plants) and 30-40 t\h (on the plants "Rosija", Donetsk-region).

| Object | Coal | Granulate(agglomerate) | waste |
|---|---|---|---|
| Demonstration plant | 0 - 0,2 mm<br>14-16%-60-70%* | 0,5-5 mm 6 - 15% *<br>15-18%** | 75- 90 % * |
| Avdiivsky coke-chemistry plant | 0 - 1 mm<br>60-80%* | 0,2-1,2 mm<br>11,3-18,7%* | 73-86%* |
| Plant "Rosija" | 0 - 6 mm<br>53%* | 0,2-6,3 mm<br>18-23% * 19-20%** | 76-77%* |

* $A^d$,%; ** $W^r_t$,%.

Besides that, we have investigated six major technological alternatives(schemes) in hydrotransport. Analysis and summarising of investigation results allow to draw a conclusion as to obvious attractiveness of the hydrotransport-agglomeration technique. Utilisation of oil granulation technique for conveyed long-distance hydrotransport system(LHS) allows the following:

to decrease moisture content of sedimentation centrifuge cake by a factor of 2-3 at a transportation distance of 250-1700 km;

to substantially reduce losses of coal fines in sedimentation centrifuge centrates at the LHS end terminal and ensure that ash content of a centrate solid phase be > 80%;

to maintain technological properties of coking coals while transportation in water flow at a distance upto 500 km.

Therefore, oil agglomeration is a perspectiv-process for coal preparation and long-distance hydrotransport.

The central problem of "coal-reagent" interaction during coal aggregation has been solved. A presence of chemical bonds, H-bonds in a "coal-oil" interphase zone, the changes in a supermolecular structure of coal during pelleting it have been established (on the example of ukrainian salty coals). Made a mathematical description of processes for forming coal-oil aggregates including kinetics. Analysis of factors which influence on the process, its mathematic models has been realized.

Rational conditions of pelleting of energetic and coking coal, coal row material and products of coal preparation plants, electric power stations, hydraulic transport systems have been determined. Results of complex study of technologic properties of coal aggregates as objects of dewatering, hydrotransportation, consumption, coking, pyrolysis and carriers at gold adhesive preparation have been presented.

The elaborated theoretical principles and experimental data served as a basis for creating about 40 new methods and devises, that permit realise the process of coal selective oil agglomeration. The universality, polifunctionality and simplicity of realizing the process of selective oil agglomeration, possibility of oil aggregation of different coals has been demonstrated.